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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/538,118	06/07/2005	Yoshito Hashimoto	70404.62/ok	8790

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EXAMINER

HON, SOW FUN

ART UNIT	PAPER NUMBER
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1794

NOTIFICATION DATE	DELIVERY MODE
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07/24/2009

ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary	Application No. 10/538,118	Applicant(s) HASHIMOTO ET AL.	
	Examiner SOPHIE HON	Art Unit 1794	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 6/24/09.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1 and 6-10 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,6-10 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Response to Request for Reconsideration

1. Applicant's request for reconsideration of the finality of the rejection of the last Office action is persuasive and, therefore, the finality of that action is withdrawn. However, upon further consideration, new grounds of rejection are set forth below.

Withdrawn Rejections

2. The 35 U.S.C. 103(a) rejections of claims 1, 5-10 in the Office action dated 02/24/09 are withdrawn due to Applicant's arguments dated 06/24/09.

New Rejections

Claim Rejections - 35 USC § 102

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

3. Claims 1, 7 are rejected under 35 U.S.C. 102(b) as being anticipated by Menzer (US 3,137,601).

Regarding claim 1, Menzer teaches a plastic substrate comprising: a composite substrate in which fibers are embedded in a resin matrix (resin impregnated fiber sheet, column 1, lines 29-31), the fibers being arranged to extend in two nearly orthogonal directions within the plane of the composite substrate (fibers arranged in crossed relation so as to form a matted structure, column 1, lines 70-72), wherein the composite

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substrate substantially transmits visible radiation (light transmission, column 21, lines 45-55).

Although Menzer is silent regarding the optical anisotropy of the composite substrate, and thus fails to disclose that the composite substrate has negative uniaxial anisotropy and an in-plane retardation of substantially zero, the evidence as set forth below, when considered together, shows that the composite substrate of Menzer inherently has the claimed optical anisotropy properties.

I. Menzer teaches the claimed arrangement where the fibers are arranged in two nearly orthogonal directions within the plate of the composite substrate, as described above. Applicant's specification teaches that the arrangement direction of the fibers is technically important in that it affects the retardation characteristics (page 12, lines 10-15).

II. Menzer teaches that the refractive index of the fibers matches the refractive index of the resin (column 2, lines 40-43, 54-58) to avoid interference so as to provide undistorted light transmission through the composite substrate (column 2, lines 40-50). Applicant's specification teaches the same (to minimize the scattering, page 19, lines 1-10).

III. Menzer teaches that the fibers are glass fibers (column 1, lines 70-72) and that the resin matrix can be an epoxy resin one (column 2, lines 24-28). Applicant's specification teaches the same (glass fibers, page 19, lines, 5-10, epoxy resin, page 15, lines 13-16).

IV. Menzer teaches that the resin sheet is thermally heated during the manufacturing process of the composite substrate (put in a heated chamber to accelerate the setting operation, column 2, lines 15-20). Applicant's specification teaches that the refractive anisotropy of the composite substrate is believed to be produced photoelastically due to the thermal stress caused by a difference in thermal expansion coefficient between the fibers and the resin matrix during the manufacturing process of the composite substrate (page 20, lines 10-20). In the instant case, the refractive index anisotropy is a negative uniaxial anisotropy for the claimed arrangement combined with the disclosed materials, as discussed. Negative uniaxial anisotropy is represented mathematically in terms of the refractive indices n_x , n_y and n_z of the major optical axes of x, y and z, by the inequality of $n_z > n_x \approx n_y$; where, since $n_x \approx n_y$, and the optical axes of x and y are in-plane, it follows that the in-plane retardation of the composite substrate is substantially zero.

To summarize, the composite substrate of Menzer has the requisite arrangement of the glass fibers disclosed by Applicant, in the epoxy resin matrix disclosed by Applicant; it has the requisite matching of the refractive index of the glass fibers with refractive index of the epoxy resin matrix; and it is produced by a manufacturing process that includes thermal heating which causes some thermal stress due to a difference in thermal expansion coefficient values between the glass fibers and the epoxy resin matrix, which Applicant believes to be the cause of the negative uniaxial refractive anisotropy of the composite substrate, wherein the negative uniaxial refractive

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anisotropy of the composite substrate means that the in-plane retardation has to be substantially zero, as discussed above.

Therefore, the composite substrate of Menzer is expected to have a negative uniaxial refractive index and an in-plane retardation of substantially zero.

Although Menzer fails to teach that the composite substrate is for use in optical instruments, a recitation of the intended use of the claimed invention must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim. In the instant case, the composite substrate of Menzer has the same structure and materials disclosed by Applicant, as described above, and is taught as being suited for optical use (undistorted light transmission, column 2, lines 45-50). Thus the composite substrate of Menzer is capable of performing the intended use.

Regarding claim 7, Menzer teaches that the fibers are embedded in the resin matrix as a bundle of fibers, a woven fabric or a nonwoven fabric (column 2, lines 5-10).

Claim Rejections - 35 USC § 103

4. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Menzer as applied to claims 1, 7 above, and further in view of Emerson (US 3,353,895).

Menzer teaches the composite substrate which substantially transmits visible radiation, as described above. In addition, Menzer teaches that the composite substrate is suitably arranged about a light source to provide a display (column 1, lines

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45-52). Menzer fails to teach that the composite substrate functions as a quarter-wave plate.

However, Menzer teaches that the composite substrate is suitably arranged about a light source to provide a display (column 1, lines 45-52), wherein the composite substrate is suitable for use in optical instruments as described above.

Emerson teaches a composite substrate in which fibers are embedded in a resin matrix (a layer of plastic cast on or applied to a surface carrying the filaments, column 2, lines 8-10), where, when the fibers of the composite substrate are arranged at 45° to the long direction of filaments 32 in another layer, the composite substrate functions as a quarter-wave retardation layer (column 6, lines 30-40).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made, to have arranged the composite substrate of Menzer such that it functions as a quarter-wave plate, in order to obtain the desired phase compensation for the light display, as taught by Emerson.

5. Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Menzer as applied to claims 1, 7 above, and further in view of Babb (US 5,730,922).

Menzer teaches the composite substrate which substantially transmits visible radiation, as described above. Menzer fails to teach a protective coating on at least one principal surface of the composite substrate.

However, Babbs teaches a composite layer in which fibers (woven glass fiber, column 2, lines 39-40) are embedded in a resin matrix (column 2, lines 44-45). Babbs teaches that the composite laminate further comprises a coating on at least one

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principal surface of the composite layer (layer of polymer added to improve at least one property, column 2, lines 23-29) for the purpose of providing protection from moisture and scratching (resistance, column 2, lines 25-32).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made, to have provided a protective coating on at least one principal surface of the composite substrate of Menzer, in order to obtain the desired scratch resistance and moisture resistance, as taught by Babbs.

6. Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Menzer as applied to claims 1, 7 above, and further in view of Speakman (US 6,503,831).

Menzer teaches the composite substrate which substantially transmits visible radiation, as described above. Menzer fails to teach that the composite substrate is used as a substrate in a liquid crystal display device comprising a liquid crystal layer.

However, Menzer teaches that the composite substrate is suitably arranged about a light source to provide a display (column 1, lines 45-52), wherein the composite substrate is suitable for use in optical instruments as described above.

Speakman teaches a liquid crystal display device (column 25, line 10) which display medium is a liquid crystal layer by definition. Speakman teaches that a typical substrate for the device comprises a composite substrate in which fibers are embedded in a resin matrix (fiber-reinforced epoxy resin sheet, column 45, lines 37-40), for the purpose of utilizing its physical properties.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made, to have used the composite substrate of Menzer as a

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substrate of a liquid crystal display device, as taught by Speakman, in order to provide a suitable substrate with the desired physical properties.

7. Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Menzer in view of Speakman as applied to claim 9 above, and further in view of Arakawa (US 2002/0060762 A2), as evidenced by Emerson (US 3,353,895).

Menzer, as modified by Speakman, teaches a liquid crystal display device comprising the composite substrate, as discussed above. Menzer, as modified by Speakman, fails to teach that the composite substrate functions as a quarter-wave plate, or that the liquid crystal display device further comprises a polarizer arranged such that the absorption axis of the polarizer is either substantially parallel or substantially perpendicular to the at least one predetermined direction in which the fibers are arranged.

However, Emerson teaches a composite substrate in which fibers are embedded in a resin matrix (a layer of plastic cast on or applied to a surface carrying the filaments, column 2, lines 8-10), where, when the fibers of the composite substrate are arranged at 45° to the long direction of filaments 32 in another layer, the composite substrate functions as a quarter-wave plate (column 6, lines 30-40).

Arakawa teaches that a plastic substrate that functions as a quarter-wave plate, can be used as one of the substrates which sandwich the liquid crystal layer in a liquid crystal display device, for the purpose of reducing the weight and the thickness of the display device (page 1, [0014]) as well as providing the desired optical retardation compensation. A liquid crystal layer has optical anisotropy which requires optical

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retardation compensation to provide an undistorted image display, as is well known in the art. Arakawa teaches that the liquid crystal display device further comprises a polarizer 32 disposed on one side of the liquid crystal layer 28, for the purpose of providing the desired linearly polarized light (page 8, [0084]). Arakawa teaches that when the transmission axis of the polarizer is substantially parallel to the anisotropic and hence transmitting axis of the composite substrate that functions as a quarter-wave plate, the linearly polarized light transmitted by the polarizer is transmitted by the quarter-wave plate (page 8, [0084]). The absorption axis of the polarizer is perpendicular to the transmission axis of the polarizer, and is thus substantially perpendicular to the anisotropic axis of the composite substrate.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made, to have arranged the composite substrate in the liquid display device of Menzer, as modified by Speakman, to function as a quarter-wave plate, in order to provide the desired optical retardation compensation, as taught by Emerson, and further, to have placed a polarizer such that the absorption axis of the polarizer is substantially perpendicular to the anisotropic axis of the composite substrate, and hence the at least one predetermined direction in which the fibers are arranged in the composite substrate, in order to provide the desired transmission of linearly polarized light, as taught by Arakawa.

Response to Arguments

8. Applicant's arguments have been considered but are moot in view of the new ground(s) of rejection.

Any inquiry concerning this communication should be directed to Sow-Fun Hon whose telephone number (571)272-1492. The examiner can normally be reached Monday to Friday from 10:00 AM to 6:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Sample, can be reached on (571)272-1376. The fax phone number for the organization where this application or proceeding is assigned is (571)273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

/Sophie Hon/

Sow-Fun Hon

Examiner, Art Unit 1794

/David R. Sample/

Supervisory Patent Examiner, Art Unit 1794